DR-18. HYBRID MOLECULES BASED ON FULLERENE C_{60} AND SPIROPYRANS – PERSPECTIVE CHEMO- AND PHOTOSENSORS

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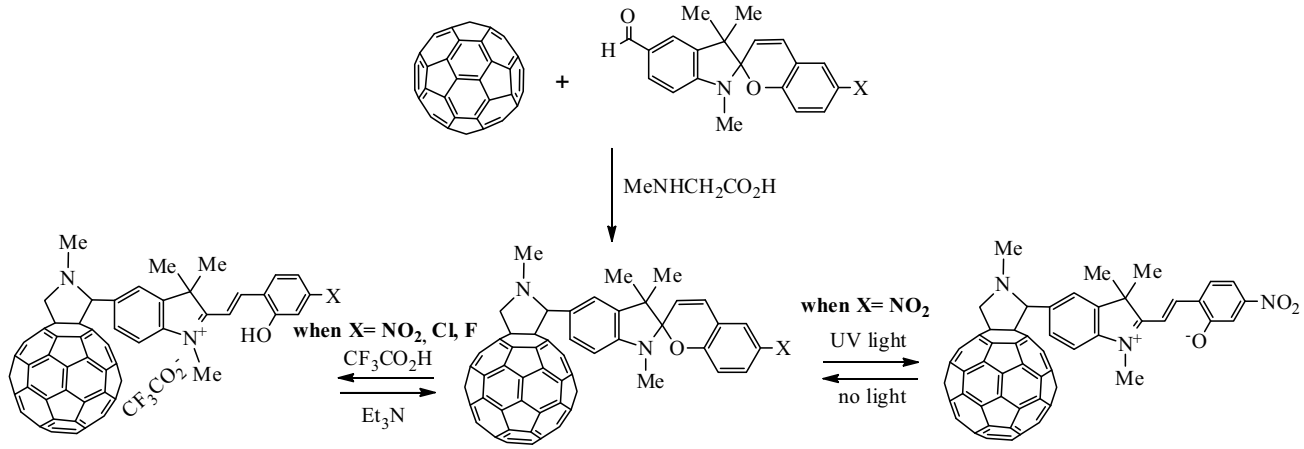
In this report, the authors announce the synthesis of pyrrolidinofullerenes **1–3**, first representatives of chemically coupled hybrid molecules resulted from 1,3-dipolar cycloaddition reaction between C_{60} and azomethynilides of spirophotochromes generated *in situ* (Scheme) .



1: X= NO_2; **2:** X= Cl; **3:** X= F

Physico-chemical studies of the resulting pyrrolidinofullerenes **1–3** showed that only cycloadduct **1** containing the NO_2 group in the pyran moiety of the molecule undergoes reversible photoconversion, while compounds **2** and **3** do not undergo photochromic transformations both upon constant and pulsed photoexcitation [1].

The authors have assumed that the absence of photochromism in pyrrolidinofullerenes **2** and **3** can be caused by the reabsorption of the activating radiation by the fullerene skeleton, since the absorption bands attributed to the spiran forms of the initial compounds effectively overlap with the absorption spectrum of fullerene C_{60}.

In order to create nanomaterials with controlled properties, for the first time, the electrical properties of hybrid molecules **1–3** were studied by means of chemical or photochemical exposure.

The experiments have shown that, at photochemical exposure, the switching of electrical conductivity in single-molecular devices based on pyrrolidinofullerenes **1–3** was observed only in the case of hybrid molecules with the NO_2 group in the photochromic addend due to isomerization of the latter to merocyanine. When CF_3CO_2X is introduced into these systems, the switching of electrical conductivity was observed for all devices that we received, regardless of the nature of the substituents in the spiropyran moiety.

References

1. Synthesis, structure and photochromic properties of hybrid molecules based on fullerene C_{60} and spiropyrans / A. R. Tuktarov [et al.] // RSC Adv. The Royal Society of Chemistry, 2016. Vol. 6, № 75. P. 71151.

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